



## **SAFETY PROGRAM:**

### **FALL PROTECTION**

2/18/99; Revision 12/20/2004

The Language Used In This Document Does Not Create An Employment Contract Between The Employee And The Agency. This Document Does Not Create Any Contractual Rights Or Entitlements. The Agency Reserves The Right To Revise The Content Of This Document, In Whole Or In Part. No Promises Or Assurances, Whether Written Or Oral, Which Are Contrary To Or Inconsistent With The Terms Of This Paragraph Create Any Contract Of Employment.

### **PURPOSE**

The purpose of this policy is to set forth requirements to provide protection for any employee working for the SC Budget and Control Board (BCB or Board) when using ladders or scaffolds; vehicle-mounted, elevating and rotating personnel work platforms; or when exposed to an unprotected edge or other fall hazards as required by the Occupational Safety and Health Act (OSHA).

### **POLICY**

Any BCB or contracted employee (hereafter noted as “employee,” “worker” or “user”) working on a work or walk surface in a facility owned or operated by BCB or using a ladder or scaffolds, vehicle-mounted, elevating and rotating personnel work platforms, or when exposed to an unprotected edge or other fall hazards over four (4) feet above the ground or above a lower level, shall do so in accordance with the procedures outlined in this policy and applicable OSHA standards.

Note: A working or walking surface is any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not ladders, vehicles or trailers on which employees must be located in order to perform their duties. “Over four (4) feet” is used by BCB in defining when an employee is exposed to a fall hazard, as it is the most restrictive of the various OSHA standards relating to fall protection.

### **Applicable OSHA Standards:**

- 29 CFR 1910 - Occupational Safety And Health Standards:
  - Subpart D—Walking-Working Surfaces
    - 1910.23 – Guarding floor and wall openings and holes
    - 1910.24 – Fixed industrial stairs
    - 1910.25 – Portable wood ladders
    - 1910.26 – Portable metal ladders
    - 1910.27 – Fixed ladders
    - 1910.28 – Safety requirements for scaffolding
    - 1910.29 – Manually propelled mobile ladder stands and scaffolds
    - 1910.30 – Other working surfaces

- Subpart F - Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms
    - 1910.66 – Powered platforms for building maintenance
    - 1910.67 – Vehicle-mounted elevating and rotating work platforms
    - 1910.68 – Manlifts
  - Subpart I – Personal Protective Equipment
- 29 CFR 1926 - Safety and Health Regulations for Construction:
  - Subpart E – Personal Protective Equipment and Life Saving Equipment
    - 1926.104 – Safety belts, lifelines and lanyards
  - Subpart L—Scaffolds
  - Subpart M - Fall Protection
  - Subpart X - Ladders

## **PROCEDURES**

1. Employees exposed to work over four (4) feet above the ground or a lower level are to be able to recognize fall hazards, and select and use appropriate fall protection measures. Employees anywhere on a high-pitch roof (slope is greater than a 4-inch vertical rise for a 12-inch horizontal run) or within six (6) feet of the edge on a flat or low-pitch roof without fall protection are considered “exposed.” Employees exposed to fall hazards must at least have had specific training in pertinent provisions of regulatory standards, and be knowledgeable about various means of fall protection equipment to include manufacturer’s specifications and recommended operations to include normal and emergency procedures and controls, limits, restrictions, required personal protective equipment, maintenance and storage procedures.
2. The BCB shall designate competent persons to train employees to recognize fall hazards, and to properly select, use, maintain and store appropriate means of fall protection. Competent persons shall also establish and administer an inspection program to ensure fall protection equipment remains fully functional. These competent persons shall be sufficiently independent and impartial to allow objective decisions and have full authority to remove defective equipment from service. A “competent person” is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to employees, and who has authorization to take prompt, corrective measures to eliminate or control these hazards and conditions.
3. Fall Protection training, provided by The Safety Office to designated BCB employees, is to include:
  - The types of fall and secondary hazards in the work area to include an on-going assessment for fall hazards.
  - The correct procedures for user pre-use checks, setting up, donning, disassembling, and doffing fall protection systems.
  - The proper use and limitations of fall protection systems to be used.
  - The correct procedures for handling, maintaining and storing fall protection equipment.
  - Competent person training.

Note: If equipment is not in BCB's normal inventory and is rented, the vendor's competent person is responsible to ensure appropriate employee training and inspections, as described above, prior to use.

4. Every worker must fully understand the hazards and means of protection before ever working in a fall hazard situation. Employees must have prior knowledge of a walking or working surface's capability and integrity to support the total weight of the workers, tools and other materials required to perform the assigned task. The following work areas are identified as fall hazards when employees work over four (4) feet above the ground or a lower level:
  - Unprotected sides and edges of floors, roofs of various slopes, ramps, runways, excavations, and other walking and working surfaces
  - Hoist areas
  - Holes in walking or working surfaces including hatches, skylights, wells, pits, and shafts
  - Wall openings
5. Employees must know what protection to use to prevent falls.

A. GUARDRAIL SYSTEMS - A guardrail system is a barrier between the worker and an open upper level edge (when there is no wall or parapet) to keep the worker from falling to a lower level. This system consists of vertical support posts with a top rail 42 inches high and a mid-rail where an object 19 inches or more is not allowed to pass through the system.

B. SAFETY NET SYSTEMS - Safety net systems are installed at 30 feet or less under the unprotected edge of an upper walking/working surface to catch a falling worker in a (mesh rope) net. Note: Safety net systems are not typically used by BCB.



C. PERSONAL FALL ARREST SYSTEMS –

A Personal Fall Arrest System consists of a fixed anchorage, connectors, a lanyard and/or lifeline, an arresting device, and a full body harness.

- When the worker elects to use personal fall arrest equipment in a situation where there is a potential to fall over an unprotected edge, OSHA requires the following:
  - Full body harness (the use of body belts are prohibited).
  - Lanyard.
  - Locking/double-action snap-hooks (non-locking/single-action snap-hooks are prohibited).
  - Fall arrest decelerating device that may consist of:
    - An internal braking device such as found in a rope grab or a personnel winch that is to stop the falling employee in two feet or less.
    - An energy/shock absorber (rip-stitch or elongating) device built into or approved to be attached to the lanyard.
- If an anchor is to support more than one employee, it must be designed to support 5,000 pounds per employee.

- A personal fall arrest system shall be rigged such that an employee can neither free fall more than six (6) feet nor contact any lower level. The deceleration distance for a shock absorber is limited to an additional three and one-half (3.5) feet (a total fall distance of 9.5 feet). A most important aspect is planning before using a fall protection system. A suitable location for the anchorage point should be at or directly above the connection point (D-ring on back of body harness). Other anchorage point locations can lead to a free fall distance over six (6) feet leading to an arresting force on the falling employee that exceeds safe levels determined by OSHA (body harness -1800 pounds or less) and could cause equipment failure by exceeding its designed strength limits. Without proper planning the employee could also contact with the ground or lower level, or due to swinging sideways into objects below.
- Should an employee fall, it is vital that the employee be able to do a self-rescue with a built-in descent device or be rescued by others immediately using ladders, boom trucks or other planned means.

D. FALL PREVENTION SYSTEM - A Fall Prevention System has the same components as a Personal Fall Arrest System except it does not have the deceleration device. Additionally, the lanyard length is usually adjustable so the worker can only go up to and is prevented from falling over the unprotected edge.



#### E. POSITIONING SYSTEMS –

Designed for employees who work on walls and other vertical surfaces, a positioning system consists of:

- A full body harness with side D-rings and connectors that allow the worker to hook onto a fixed ladder or vertical structure then lean back and have hands-free operation.
- A system designed to suspend and support the user while being transported vertically (and horizontally) along a vertical work surface. Suspension systems are widely used in the window washing and painting industry. Examples: A boatswain's chair/seat sling or suspension scaffold. When such vertical positioning systems are used, each employee must be attached to a separate fall protection lifeline.

Note: OSHA requires locking/double-action snap-hooks (non-locking/single-action snap-hooks are prohibited) as part of a positioning system.

F. COVERS - Covers are to be installed to keep people from falling through holes in floors, roofs, and other walking or work surfaces.

G. LADDERS - Ladders are permanent or portable devices to allow a single worker at a time access from one level to another.

H. SCAFFOLDS - Scaffolds are temporary elevated platforms and structures used when aboveground jobs require more workers and/or equipment than a ladder can handle.

- Fall protection must be provided on all supported and suspended scaffolds more than 10 feet above a lower level. On supported scaffolds this fall protection will most often be a guardrail system installed along all open sides and ends of the platform. However, a personal fall arrest system may be necessary.

6. DROPPED OBJECTS - In an area where objects might fall from above:

A. Employees below must wear hard hats.

B. Toe-boards and/or screens or panels above the toe-boards should be used to keep objects from accidentally falling over the edge.

C. An approved canopy, designed to keep objects from penetrating it, may be installed above the workers below.

D. No materials are to be stacked closer than six (6) feet to an unprotected edge, and they have to be stable and self-supporting.

Note: Foot protection, required when working where falling objects pose a danger of foot injuries, is described in BCB Safety Footwear policy 98-102.

7. INSPECTION (see Attachment 1):

A. The user must inspect the intended fall protection equipment prior to each use for wear, damage, deterioration and proper functionality.

B. A competent person shall inspect fall protection equipment at regular intervals as recommended by the manufacturer or at least annually for wear, damage, deterioration and proper functionality. The Safety Office will maintain documentation of these inspections by the competent person.

C. Defective components to include equipment involved in an actual fall shall be removed from service for repair or for destruction and replacement.

8. It will be the responsibility of the Team Leader/Supervisor to provide his/her employees with fall protection equipment required by jobs where there is exposure to fall hazards, and to ensure proper selection, use, maintenance and storage of this equipment.

9. MAINTENANCE & STORAGE: Equipment shall be cleaned according to manufacturer's recommendations and stored in a manner to preclude damage from environmental factors such as heat, light, excessive moisture, oil, chemicals and their vapors or other degrading elements, work processes, or any means that could cause damage.

## ATTACHMENT 1

### INSPECTION OF PERSONAL FALL PROTECTION EQUIPMENT

NOTE: The following information is generic advice related to inspecting personal fall protection equipment, is not all-inclusive, and is not a replacement for the manufacturer's specific inspection procedures.

GENERAL: Full-body harnesses used by the BCB are of the web-type while lanyards are made from rope or webbing. There is a wide range of possible causes of degradation to the natural or synthetic fibers in these fall protection devices including an actual fall, abuse, general wear and tear, edge and surface damage, ultraviolet light, dirt, grit, acidic or alkaline chemicals, heat, etc. There is no well-defined usable life span as it depends on the work environment to which it has been subjected. However, cuts as small as 1 mm in the edge of a lanyard can result in up to a 40% loss of strength. It is therefore essential to keep the required level of protection through an effective maintenance and inspection program.

#### PROCEDURE:

1. The Program Manager, the Safety Office, will in writing designate persons by name as competent persons for fall protection.

2. The Safety Office will take inventory of all BCB fall protection equipment and establish regular inspection intervals usually in accordance with the manufacturer's recommendations or at least annually. Each piece of fall protection equipment must be indelibly and permanently marked so as to be uniquely identifiable for respective inspection documentation.

#### 3. INSPECTION:

A. In accordance with the prescribed inspection frequency, a competent person will inspect all BCB fall protection equipment for wear, damage, deterioration and proper functionality.

B. The user must conduct a pre-use check of the intended fall protection equipment prior to each use for wear, damage, deterioration and proper functionality.

C. Each unit should undergo a visual and tactile inspection, e.g., by being passed slowly through the hands while under a good light.

1) Harnesses: While holding the harness by the back D-ring, start at the top by grasping one strap with your hands about 6 to 8 inches apart, bend the webbing in an inverted "U" (see diagram), and move over both sides of all shoulder, back, leg, and chest straps in this manner. Look for frayed edges, broken fibers, pulled stitches, cuts, burns, chemical and other damage. Broken webbing strands generally appear as tufts in the webbing surface.

Inspect: Harness Webbing



& D-Rings



a. D-Rings: Check the metal or plastic wear pads for distortion, cracks, breaks, and rough or sharp edges. The D-Ring bar should be at 90 degrees with the long axis of the belt and should pivot freely. Note any unusual wear, frayed or cut

fibers or stitching, cracks or distortion in the webbing holding the D-ring. Rivets should be tight and unmovable with the fingers, and should be flat against the material (bent rivets will fail under stress).

b. Buckles: Buckle tongues or the billet of a belt or strap usually receive heavy wear from repeated buckling and unbuckling. Look for loose, distorted or broken grommets. Webbing should not have additional punched holes. Buckle tongues should overlap the buckle frame and move freely back and forth in their socket. Check the roller for freedom of movement on the frame, distortion and sharp edges. Pay special attention to the outer and center bars on friction and mating buckles to be straight and without burrs or cracks.



Inspect: Buckles, Attachments & Grommets

1) Lanyard: Begin at one end and work to the opposite end slowly rotating the lanyard for a complete check.

a. Snap Hook: Look closely for hook and eye for distortion, cracks, corrosion or pitting. The keeper (latch) should seat into the nose without binding and should not be distorted or obstructed. The keeper spring locks should exert sufficient force to firmly close the keeper and prevent opening when the lock is not depressed.

b. Thimbles: The thimble must be firmly seated in the eye of the splice and be free of sharp edges, distortion or cracks. The splice should have no loose or cut strands.



Inspect: Snap Hooks

Thimbles

c. Web Lanyard: While bending the webbing over a pipe or mandrel, observe each side for cuts or breaks, broken stitching, signs of chemical or heat damage (swelling, cracks, charring or discoloration such as brownish, hard shiny spots), mildew, and accumulated dirt or grease.



Inspect Lanyards: Web

Rope

Steel

d. Rope Lanyard: Rotate the rope lanyard while looking from one end to the other for knots, fuzzy, worn, broken or cut fibers, and accumulated dirt or grease. Weakened areas (from extreme loads) will appear as a noticeable change in diameter of the rope; the diameter should be uniform (the same) throughout.

e. Steel Wire Lanyard: Rotate the wire rope while looking from one end to the other for cuts, frays, kinks or unusual wearing patterns on the wire. Broken strands will separate from the body of the wire rope. With a gloved hand, slide a piece of cotton cloth along the length of the lanyard and look for cotton tufts indicating

broken wire strands. Also check for accumulated dirt or grease that could interfere with the braking action of a rope grab or self-retracting lifeline.

1) Shock-Absorber/Deceleration Device: Examine shock absorbers as you would for Web Lanyards. Check the outer covering for tears, burns and other damage. Also look for a warning flag or signs of deployment such as broken stitching or a displaced sheath cover. If there are signs of deployment, remove the shock absorber from service. (Note that most shock absorbers are built into the lanyard as one unit.) Examine the stitching where the cover is sewn to D-rings, belts or lanyards for damage such as loose strands, rips or deterioration.



Inspect: Shock-Absorber

4. The way you use your fall protection equipment is important.

A. Avoid situations where the lanyard rubs against a rough or sharp surface as it could be damaged or, in a fall arrest, the surface could cut right through the lanyard. Use a carpet or a rubber pad to protect the lanyard from abrasion.

B. Do not loop a lanyard around an anchorage point and hook it back onto itself. This can reduce the lanyard's strength by half. If you need to use a beam as an anchorage point, use a tie-off adapter.

C. Do not disable or over-ride a safety feature.

D. Work in pairs with one person as a safety monitor.

1. Defective components to include equipment thought to be defective or if there is any doubt about its safety shall be removed from service and tagging for repair or for destruction and replacement. Fall protection equipment that has been involved to arrest an actual fall should never be reused; it should be removed from service immediately and destroyed or returned to the manufacturer. Examples of defects and damage:

A. Cuts of 1 mm or more at the edges of webbing, e.g., where the webbing may have been choke-hitched around steelwork.

B. Surface abrasion across the face, at the edges of the webbing or at the webbing loops especially if localized.

C. Partially deployed energy absorber such as damage to stitching, e.g., cuts or abrasion or a "flag" is partially to fully deployed.

D. A knot other than intended by the manufacturer.

E. A chemical contaminant, especially if there is a softening or hardening of the fibers often indicated by surface flaking or a change in color.

F. Heat or friction damage indicated by fibers with a glazed appearance that may feel harder than surrounding fibers.

G. Ultraviolet (UV) damage, which may show a loss of color or a powdery surface.

H. Contamination due to dirt, grit, sand, etc. which may result in internal or external abrasion.

I. Damaged or deformed fittings (Carabiners, screw links, connectors, hooks, etc.) such as cracks, sharp edges

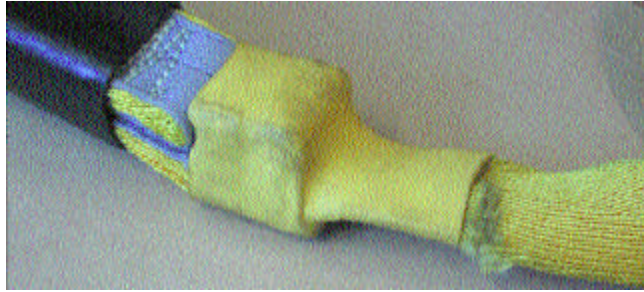
J. Damage to the sheath or core of a kernmantel rope, e.g., the core gathers into a lump or folds (rucking), or internal damage to a cable-laid rope.



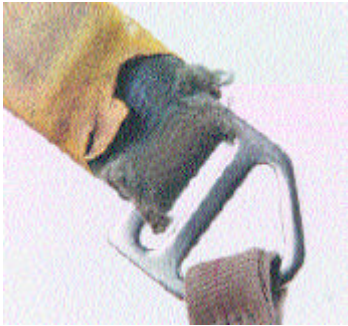
- K. Alteration.
- L. Fraying, un-splicing, un-laying, kinking, broken strands, excessive elongation or excessive aging.
- M. Missing or illegible labels.



Damaged absorber cover



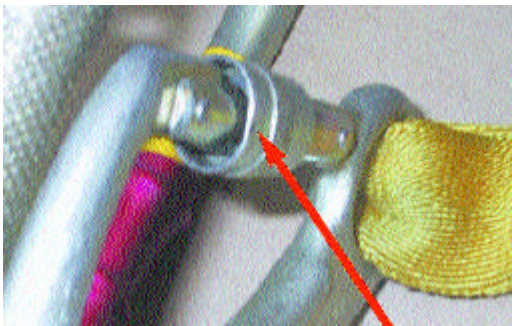
Displaced absorber cover & abrasion damage



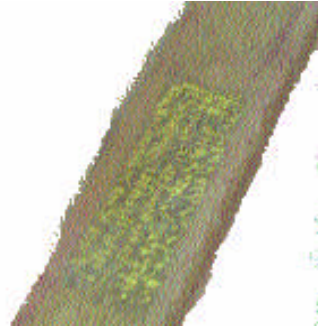
Wear damage at buckle



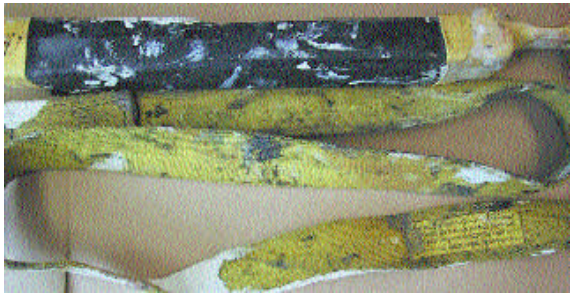
Damaged absorber sleeve



Deformed/damaged gate on Carabiner



Identification Label missing / not legible



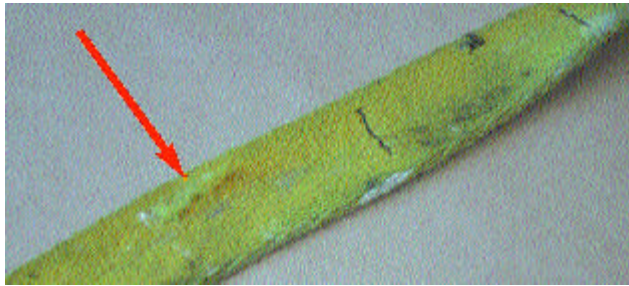
Paint (chemical) contamination



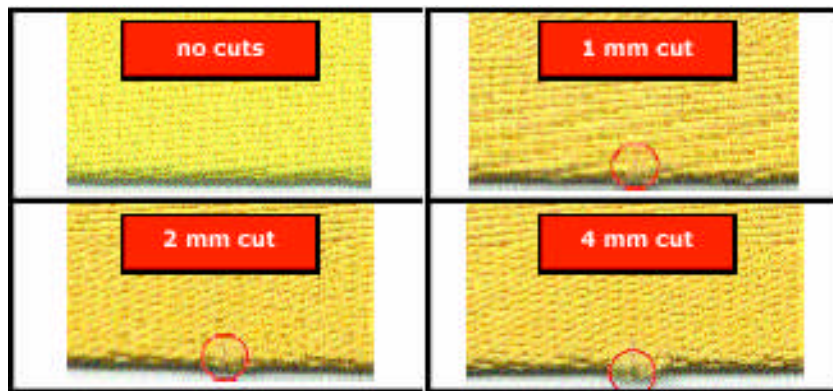
Top: Heavily soiled & worn  
Bottom: New



Abrasion



Abrasion & Discoloration



Examples of Cut Webbing

## 5. Maintenance & Storage:

### A. Cleaning Nylon or Polyester:

1) Remove all surface dirt with a sponge dampened in plain water. Then, using a sponge dipped in a solution of water and a mild commercial soap, work up a thick lather with a vigorous back and forth motion. Wipe with a clean cloth.

2) Hang freely to dry but away from excessive heat, steam or long periods of sunlight.

A. Storage should be clean, dry and free of exposure to fumes, corrosive or any damaging elements.

6. The Safety Office will maintain documentation of these inspections by the competent person.